**REMARKS**

In accordance with the foregoing, no claims have been amended or added. No new matter is being presented.

Claims 1, 3-8, and 10 are pending and under consideration. Reconsideration is respectfully requested.

Office Action Response to Arguments

Applicant appreciates the Examiner's detailed response to Applicant's argument that the U.S. Patent No. 6,285,711 B1 to Ratakonda et al. (Ratakonda) reference teaches away from "Efficient Block Motion Estimation Using Integral Projection" by Sauer et al. (Sauer).

However, Applicant would like to specifically submit that although Ratakonda teaches an improved version of Sauer, there is an explicit teaching away in Ratakonda from using the integral projection method of Sauer stated. Specifically, Ratakonda states: "Comparisons of the techniques have shown that quasi-projection matching method of the invention provides better results than integral projection..." Ratakonda, 6:9-6:16.

Thus, Applicant respectfully maintains that a person of ordinary skill, upon reading that the "quasi-projection matching method *provides better results* than integral projection," *would* be led in a direction divergent from the path that was taken by the Applicant. Namely, the person of ordinary skill would be led to develop upon a quasi-projection matching method rather than other methods because this method was claimed to *provide better results.*

In all, Applicant respectfully submits that in view of all other factors discussed below, the majority of factors in determining patentability weigh towards non-obviousness in the claims. Reconsideration of the allowability of the claims is respectfully requested.

REJECTIONS UNDER 35 U.S.C. §103

Claims 1, 5, 8, and 10 stand rejected under 35 U.S.C. §103(a) in view of Sauer and Ratakonda. This rejection is respectfully traversed.

Sauer

Sauer describes a block motion estimation scheme which is based on matching of integral projections of motion blocks with those of the search area in the previous frame. Sauer

considers a block size of K x K pixels and uses a mean absolute error (MAE) criterion to obtain integral projection-based estimates.

Claims 1, 5, 8 and 10 Patentably Distinguish Over Sauer

Claim 1 recites:

> wherein the vertical motion vector calculation part comprises:
>
> a vertical pixel value storage which adds values of pixels of each of horizontal lines forming the first frame to calculate vertical sums, and stores the vertical sums by horizontal line; and
>
> a first SAD value calculator which calculates differences between the vertical sums of the first frame and vertical sums of the second frame calculated by adding values of pixels of each of horizontal lines forming the second frame, and processes the differences into absolute values to calculate sums of absolute difference (SAD) values

The Office Action interprets the estimated vertical and horizontal displacement of Sauer as meaning the claimed vertical motion vector and horizontal motion vector. Here, Applicant respectfully submits that the estimated vertical and horizontal displacement of Sauer are described in equation 2, and are represented by a(hat) and b(hat) respectively.

The vertical projection and horizontal projection vectors of Sauer are computed using a block of K x K pixels.

As shown in equation 2 of Sauer, the vertical and horizontal displacement of Sauer incorporates the result of equation 1 of Sauer, which is the vertical projection vector of Sauer.

In contrast, the claimed "first frame" and "second frame" are not blocks of matching dimensions, as "frames" include a rectangular set of pixels with a different width and height dimension.

Further, in Sauer, the values calculated into the projection vector of Sauer are mean values as shown in the summation formula of equation 1 of Sauer. Specifically, the summation is divided by the block size K, which is the number of total values in the summation, under an integral projection method.

In contrast, neither the claimed "vertical sums" nor the "first SAD value calculator " recite any division upon any of the values. In addition, Sauer uses a mean value in its calculations because Sauer uses an MAE criterion to compare the pixel differences.

In contrast, the claimed "vertical motion vector calculation part" comprises "a first SAD value calculator which calculates ... sums of absolute difference (SAD) values." Applicant respectfully submits that a SAD calculation is patentably distinguishable over an MAE calculation for at least the reasons stated above.

Still further, Sauer describes in para. 2 of section II. A., that the projection vector for the previous frame is collected using a larger candidate area (K+2s) x (K+2s). Thus, Sauer requires an additional normalization step to place the previous projection vector in the same range as the current projection vector.

In contrast, the claimed "the vertical sums of the first frame and vertical sums of the second frame" are "calculated by adding values ... and process[ing] the differences into absolute values to calculate sums of absolute difference (SAD) values."

Thus the claimed vertical sums are not claimed as being further calculated under a normalization step, nor claimed as using a larger candidate area to create the vertical motion vector for the second frame. Applicant thus respectfully submits that Sauer does not teach or suggest the claimed vertical motion vector.

Finally, Applicant respectfully submits that Ratakonda fails to cure the deficiencies of Sauer as Ratakonda also describes an integral projection method that calculates averages, as shown in equation 4, for example, of Ratakonda. Thus, Ratakonda does not teach or suggest the claimed SAD calculation.

Therefore, for at least the reasons stated above, Applicant respectfully submits that the proposed modification of Sauer with Ratakonda does not teach or suggest all of the features of claim 1, and claim 5 which depend therefrom.

Claim 8 recites at least a similar feature as described above with respect to claim 1, with differing scope and breadth Therefore, for at least the reasons provided above regarding claim 1, Applicants respectfully submit that claim 8 and claim 10 which depends therefrom, patentably distinguish over the proposed modification of Sauer with Ratakonda.

Withdrawal of this rejection and allowance of claims 1, 5, 8 and 10 are respectfully requested.

Claims 3, 4, 6, and 7 were rejected under 35 U.S.C. § 103(a) in view of Sauer and Ratakonda and further in view of U.S. Patent No. 6,128,047 to Chang et al. (Chang). This rejection is respectfully traversed.

The Office Action states that Sauer does not disclose the claimed "adder component or selection component" but that this deficiency is cured by Chiang.

Claim 3, at least recites:

> a vertical motion vector selection unit which obtains absolute values for values added in the adder, and selects the least absolute value of the absolute values as a vertical motion vector.

The Office Action interprets the features of claim 3 as being taught or suggested in the processor, reference numeral 1110 in FIG. 12 of Chang.

However, Applicant respectfully submits that the description of the processor of Chang in col. 14, lines 6-60 fails to discuss that a "vertical motion vector selection unit" which "obtains absolute values" and "selects the least absolute value of the absolute values" is included in the processor. Thus, Applicant submits claim 3 patentably distinguishes over Chang.

Claim 6 recites at least features similar to claim 3 and thus Applicant submits that for at least similar reasons, Claim 6 patentably distinguishes over Chang.

Claim 4, at least recites:

> wherein $M$ and $N$ denote a width region and a height region, respectively, of the first frame or the second frame

The Office Action interprets the features of claim 4 as being taught or suggested in the x-directional search by comparing blocks resulting from the vertical projections of Chang as described in col. 10, lines 17-50.

However, the vertical projections in Chang are performed on an N x N candidate block, whereas claim 4 recites "M and N denote a width region and a height region, respectively." Applicant respectfully submits that an N x N candidate block and an M and N width and height region cannot be equated. This difference is further illustrated by the SAD formula in Chang described in col. 10, lines 40-45 being very different than the claimed SAD formula. Thus, any

searching performed in Chang cannot be equated to the claimed "amount of horizontal motion within a search range."

Claim 7 recites at least features similar to claim 4 and thus Applicant submits that for at least similar reasons, Claim 7 patentably distinguishes over Chang.

Therefore, for at least the reasons stated above, Applicant respectfully submits that the proposed modification of Sauer and Ratakonda with Chang does not teach or suggest all of the features of claim 1, and therefore, claims 3-4 and 6-7 which depend therefrom.

Withdrawal of this rejection and allowance of claims 3-4 and 6-7 are respectfully requested.

CONCLUSION

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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